

REMARKS

Upon entry of the amendments, claims 34-51 will be pending in the application.

Claim Rejections – 35 U.S.C. § 103

Claims 5-13 and 17-33 were rejected as obvious in view Matanaka and Gore. Applicants believe that the Examiner intended to reject claims 1, 5-13, and 17-33 in view of Hatanaka (U.S. 6,229,249) and Gore (U.S. 6,011,693).

Claims 1-33 have been cancelled from the application and the aforementioned rejection is submitted to be moot.

New Claims

Applicants have added new claims 34-51 to the application and respectfully assert that these claims are not anticipated or obvious in view of the cited prior art.

Applicants respectfully assert that independent claim 34 is not obvious or anticipated in view of the cited prior art. This claim sets forth “a plurality of electrodes for external connection independently protruding from the lower surface of said package substrate”, “an electric component mounted on the lower surface of said package substrate”, and that the “electrodes for external connection are made of solder and have a height greater than the mounting height of said electronic component”. These claimed limitations are supported by the disclosure appearing on page 13 of the application and Figure 3 (“independent legs” protrude from the lower and the electrodes 13 have a height greater than IC chip 14 and capacitor 17 located on the lower surface of the package substrate).

In contrast to the claimed invention, the external terminal electrodes of Hatanaka (parts 11-14) do not individually protrude from the lower surface of a package substrate, as clearly shown in Fig. 1 of Hatanaka. Furthermore, the external terminal electrodes of Hatanaka are not made from solder (as acknowledged in the Office Action).

Applicants provide the following further comments regarding Hatanaka. The main body 1 of Hatanaka et al. is constructed by placing four ceramic insulating layers 1a, 1b, 1c and 1d one on another (column 9, line 7-9). Of these four insulating layers, upper two insulating layers 1a and 1b constitute a partition 8, which corresponds to a package substrate of the present invention.

The external terminal electrodes 11-14 are provided at four corners of the bottom surface of the main body 1 (column 9, line 18-19). Each of these external terminal electrodes 11-14 consists of horizontal portions 11a-14a and vertical portions 11b-14b. These vertical portions 11b-14-b are formed at inner walls of a recess formed by cutting off the four corners of the lower two insulating layers 1c and 1d (column 10, line 1-7).

In view of the above, the external terminal electrodes 11-14 of Hatanaka are formed at the four corners of a “cube” (rectangular hollow member 9). Therefore, these external terminal electrodes 11-14 are not electrodes made from solder, which protrude independently from the partition 8 formed by two insulating layers 1a and 1b.

There also does not appear to be any specific teaching, hint, or suggestion in this reference establishing that the external terminal electrodes of Hatanaka should be replaced with solder balls. The Federal Circuit has explained that objective evidence of record must establish that a cited patent provides some motivation, suggestion, or teaching regarding the desirability of making the specific combination made by the Applicant. The factual question of motivation is

material to patentability, and can not be resolved on subjective belief and unknown authority. In re Sang Su Lee, 277 F.3d 1338, 61 USPQ2d 1430 (Fed. Cir. 2002).

The Examiner asserts that Hatanaka would be modified because Gore shows the use of solder balls. However, there is no factual support for this assertion. As described above, Hatanaka sets forth a particular type of external connection formed at inner walls of recesses made by cutting off the four corners of the lower two insulating layers 1c and 1d. Neither of the cited documents teaches, hints, or suggests that the type of external connection described in Hatanaka should be replaced by solder balls as set forth in Gore.

Furthermore, neither of these documents teaches, hints, or suggests solder ball electrodes having a height greater than a mounting height of an electric component mounted on the lower surface of the package substrate.

Further, it should be noted that forming each electrode for external connection with a solder having a height greater than the height of an attached electronic component (for example, a solder leg) allows easy adjustment of the height. In other words, even if an electronic component having a different mounting height is used, it is possible to adjust the height of the solder (forming the electrodes for external connection).

On the other hand, in the case of Hatanaka et al., the adjustment of the height of the external terminal electrodes 11-14 with respect to the height of the electronic devices 4, 5 is difficult because they are formed at the four corners of a cube (rectangular hollow member 9).

Moreover, in Hatanaka et al., the IC chip 3 and the electronic devices 4, 5 are mounted to the lower face of the partition 8 and arranged inside the cavity 10 of the rectangular hollow member 9. The plane shape of the cavity 10 is illustrated in Fig. 5 (bottom) view. Therefore,

access to the IC chip 3 and the electronic devices 4, 5 for the purpose of resin injection through the space between the external terminal electrodes 11-14 is impossible.

On the other hand, in the case of the present invention, an electric component is not housed inside a cavity which surrounds the electronic component, which allows easy access to the electronic component through the space formed between the electrodes for external connection.

Further, none of the references cited in the Office Action discloses a solder ball having an internal spacer such as a copper ball (claims 47, 48). In addition, none of the references discloses a through hole for connecting the piezoelectric oscillator to a corresponding connecting terminal formed in the package substrate in a region where the lid member is superposed on and bonded to the package substrate (claim 38, Fig. 14).

Similar arguments are applicable to the remaining independent claims. As such, Applicants respectfully submit that the new claims are not obvious in view of the cited prior art.

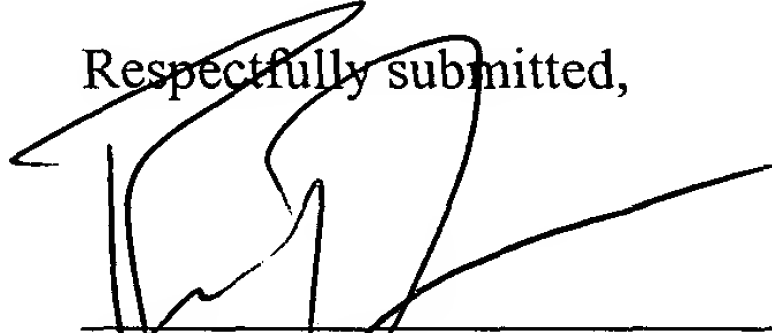
CONCLUSION

Applicants respectfully request allowance of the application. If any additional fees are due in connection with the filing of this response, such as fees under 37 C.F.R. §§ 1.16 or 1.17, please charge the fees to Deposit Account No. 02-4300. Any overpayment can be credited to Deposit Account No. 02-4300.

Respectfully submitted,

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Signature:



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